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FIELD ION MICROSCOPY

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METHOD FOR DEPOSITING PHOSPHOR SCREEN FOR  
FIELD ION MICROSCOPY

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A technique has been used at Lewis for depositing fluorescent phosphors on glass screens for use in field ion microscopy that has several important advantages over previously published methods (ref. 1, p. 167). These advantages are

(1) No binder is used, and thus binder poisoning of the phosphor is eliminated.

(2) Since it is not necessary to bake at high temperature, both time and phosphor efficiency are saved.

(3) The coating is quick and easy to replace; the phosphor washes off with water.

(4) The same glass substrate may be used over again indefinitely.

(5) No special skill is required as in other methods.

The procedure is as follows:

(1) The screen is coated with a conducting layer using the stannous chloride puffing method (ref. 1, p. 168). This process leaves the coated glass with a rough etched surface, which is very necessary to the success of the phosphor deposition. The roughness holds the deposited phosphor in place until the vehicle has dried and prevents running and streaking. Attempts have been made to use this method with uncoated glass and polished stannous chloride coatings, and it was found very difficult to produce good screens.

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(2) The screen is washed and dried thoroughly. If it is not a permanent part of the microscope tube, it should be surrounded by a rubber dam, or the like, to become the bottom of a containing vessel.

(3) A quantity of the phosphor to be used is mixed well with approximately 400 ml of acetone or other solvent. The mixture is allowed to settle for about 1 min, and the still suspended mixture is then decanted off into another container. This is done again with a settling time of about 30 sec. The final suspension is then stirred vigorously and quickly poured onto the screen. The depth of the liquid poured onto the screen and the concentration of phosphor in the mixture determine the thickness of the final phosphor coating.

(4) After the phosphor has settled (about 1 min), the acetone may either be siphoned off or left to evaporate. In the case of siphoning, the last small quantity of acetone should be left to evaporate. During this final evaporation the surface of the liquid should be kept free of air currents.

It should be pointed out that this method can only be used on flat screens, but photographic requirements necessitate these in field ion microscopy.

#### REFERENCE

1. Gomer, Robert: Field Emission and Field Ionization. Harvard Univ. Press, 1961.